The Marine and Climate Data Discovery and Access Project (MACDDAP)

Peter Blain[1], Ray Williams[12], Pauline Mak[13], Nathan Bindoff[134]

[1] Tasmanian Partnership for Advanced Computing (TPAC), University of Tasmania.
[2] School of Computing and Information Systems, University of Tasmania.
[3] Antarctic Climate and Ecosystems Cooperative Research Centre (ACE CRC).
[4] Australian Research Collaboration Service (ARCS).

Introduction to MACDDAP

- MACDDAP stands for the Marine and Climate Data Discovery and Access Project.
- The objective is to integrate the large marine and climate data sets currently distributed across Australian research institutions, using web services.
- The ultimate aim is to create a "virtual database" enabling researchers to collect, combine and analyse relevant data across scientific disciplines to facilitate knowledge discovery for marine and climate related applications.

MACDDAP is funded by the National eResearch Architecture Taskforce (NeAT) under the National Collaborative Research Infrastructure Strategy (NCRIS).

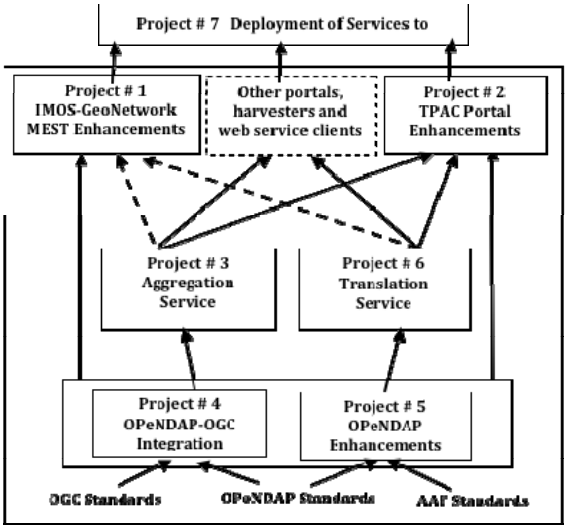
Data Streams

MACDDAP will make available, or enhance the availability of marine and climate datasets including:

- Remote sensing and oceanographic data streams from the Integrated Marine Observing System (IMOS).
- Ocean climate and weather data from the Bureau of Meteorology.
- Earth system science modeling data from TPAC.
- Marine data sets from the Australian Oceanographic Data Network (AODN)
- It is anticipated that other data sets will be made available, via MACDDAP services, in the future.

The Sub-projects

MACDDAP consists of 7 component projects:

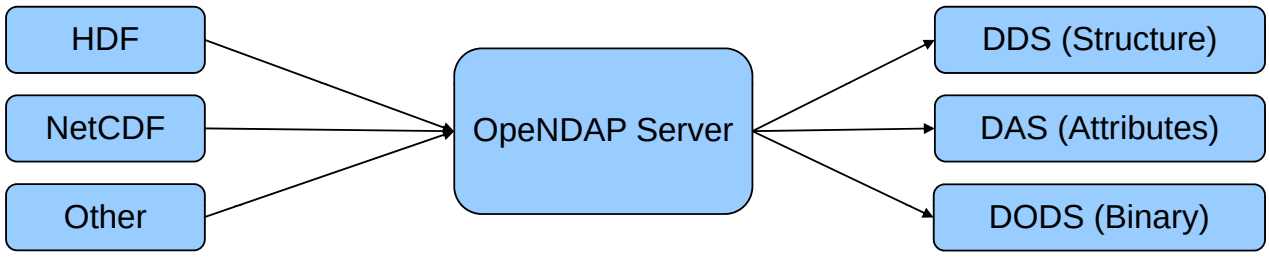


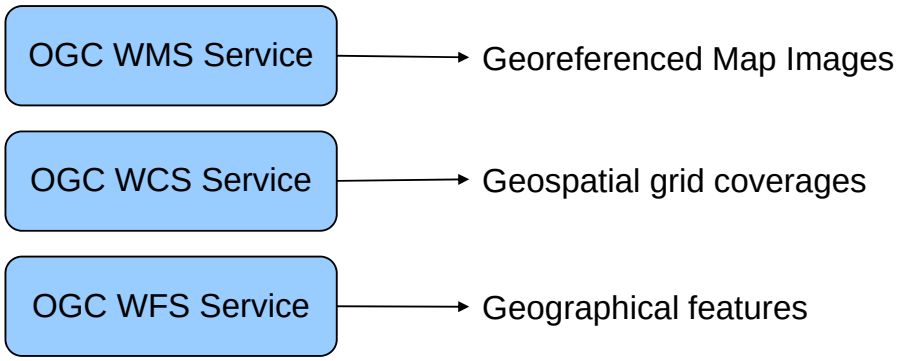
The IMOS-GeoNetwork MEST Sub-project

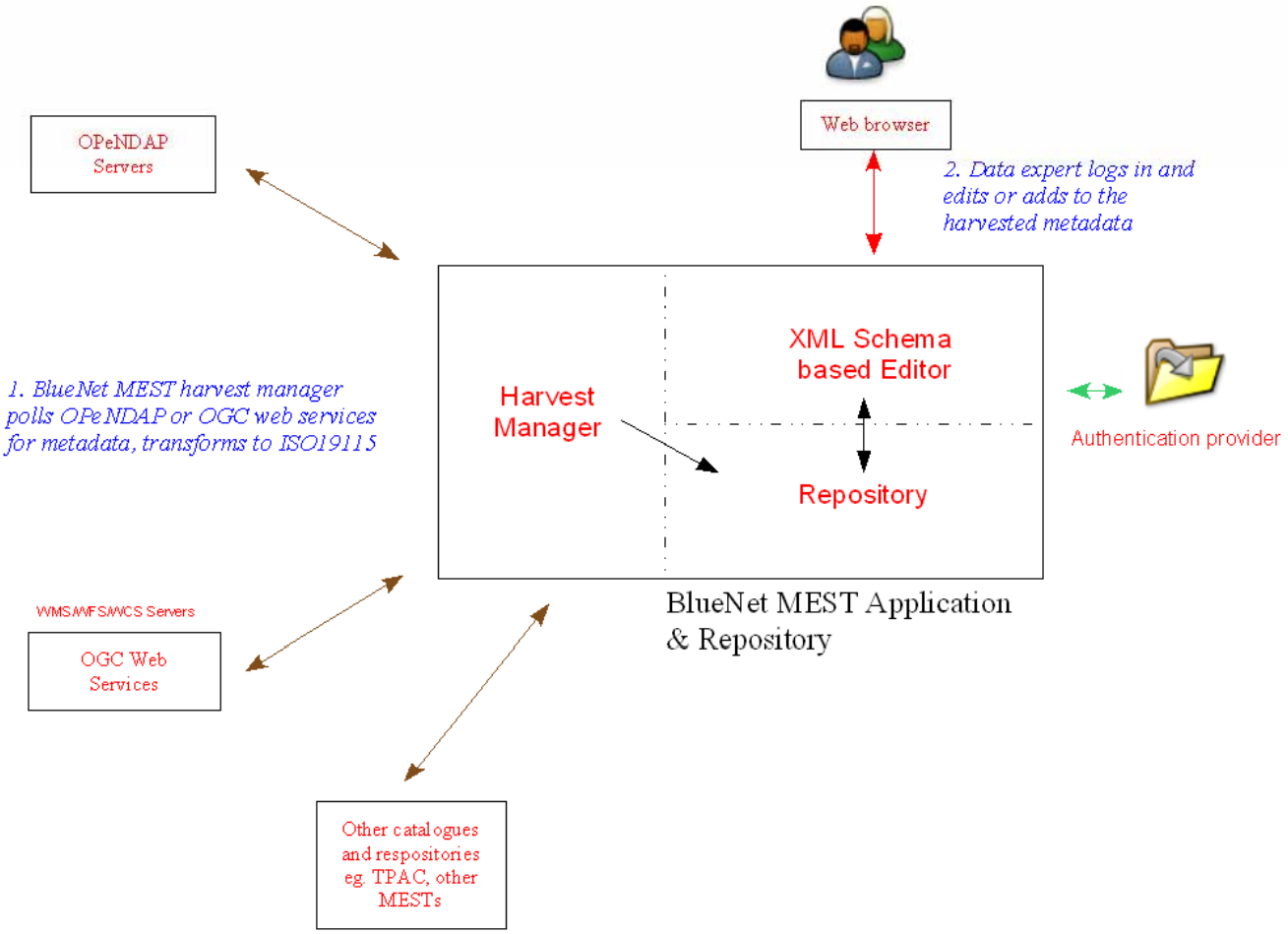
The IMOS-GeoNetwork MEST is a metadata catalogue and registry with facilities to harvest, translate, edit and store metadata. This sub-project is enhancing these to improve operability with OPeNDAP and Open Geospatial Consortium (OGC) data servers.

- Development of a marine community profile for ISO19115/ISO19139.
- Modify the MEST to allow storage and searching on the additional metadata.
- Create a THREDDS harvester to retrieve metadata.
- Australian Access Federation (AAF) standards for user authentication and trusted communications with other services.

OPeNDAP & OGC Servers







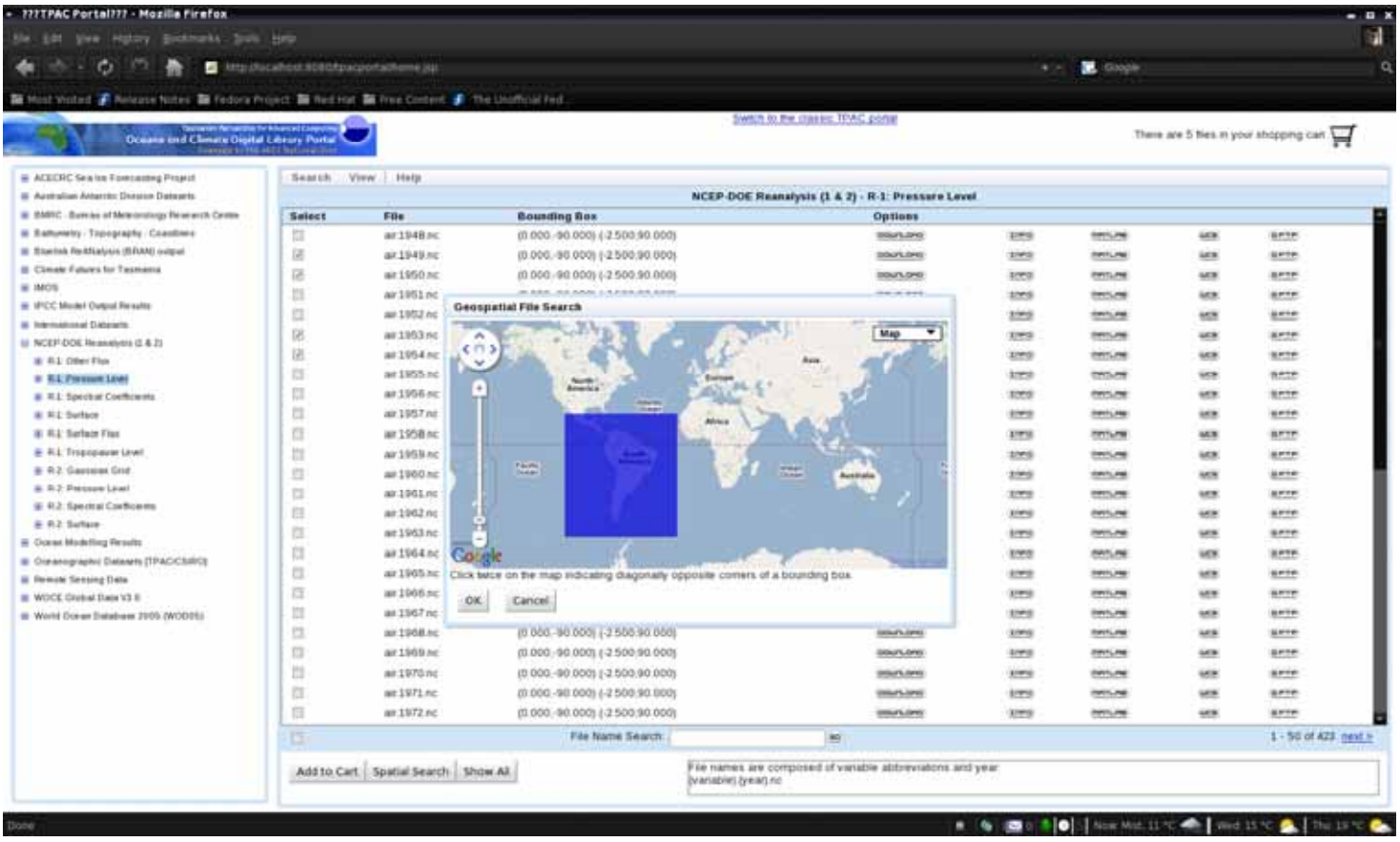
The TPAC Digital Library Sub-project

The TPAC Digital Library comprises a web portal and data harvester, which brings together data resources from major ocean and climate related research organizations across Australia. This sub-project is providing enhanced functionality for:

- Searching over latitude, longitude and time, within data categories and across categories.
- AAF interoperability
- The search capabilities of the data harvester will be improved so that it is able to handle datasets containing millions of files.
- An administrator's monitoring and notification service will be added to the portal to enable an administrator to regularly monitor usage of the Digital Library.
- Migration to Spring/GWT for an improved user experience and better scalability.

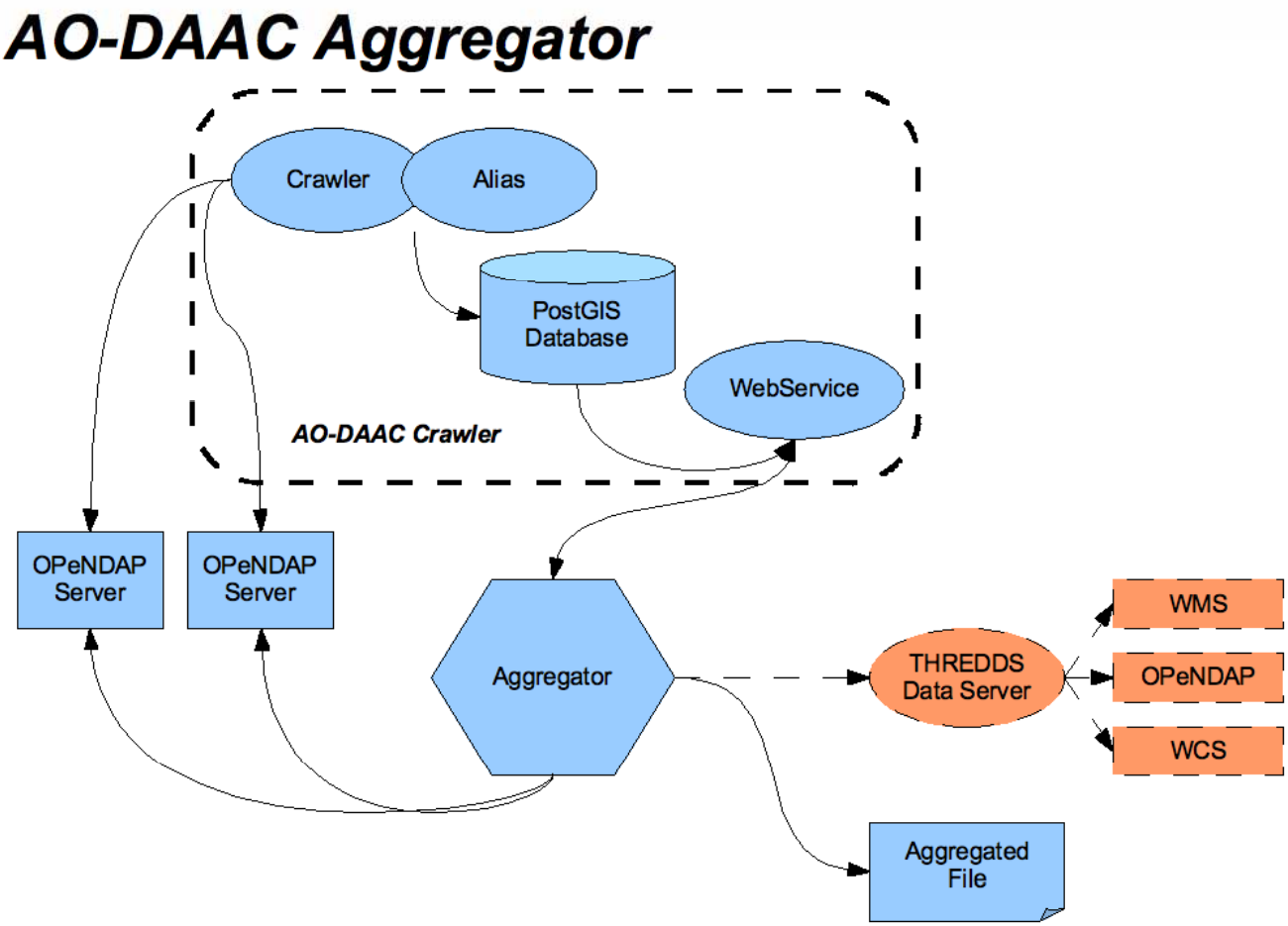
IPCC Model Output Results
NCEP-DOE Reanalysis Ocean Modeling Results
WOCE Global Data V3.0 Oceanographic Datasets [TPAC/CSIRO]
Australian Antarctic Division Datasets
Climate Futures for Tasmania
Bluelink ReANalysis (BRAN) output
ACECRC Sea Ice Forecasting Project
World Ocean Database 2005 (WOD05)
International Datasets
Bathymetry - Topography - Coastlines
BMRC - Bureau of Meteorology Research Centre
Remote Sensing Data
IMOS

The TPAC Portal provides the scientific community with ready access to a petabyte of heterogeneous and geographically distributed ocean and climate datasets.

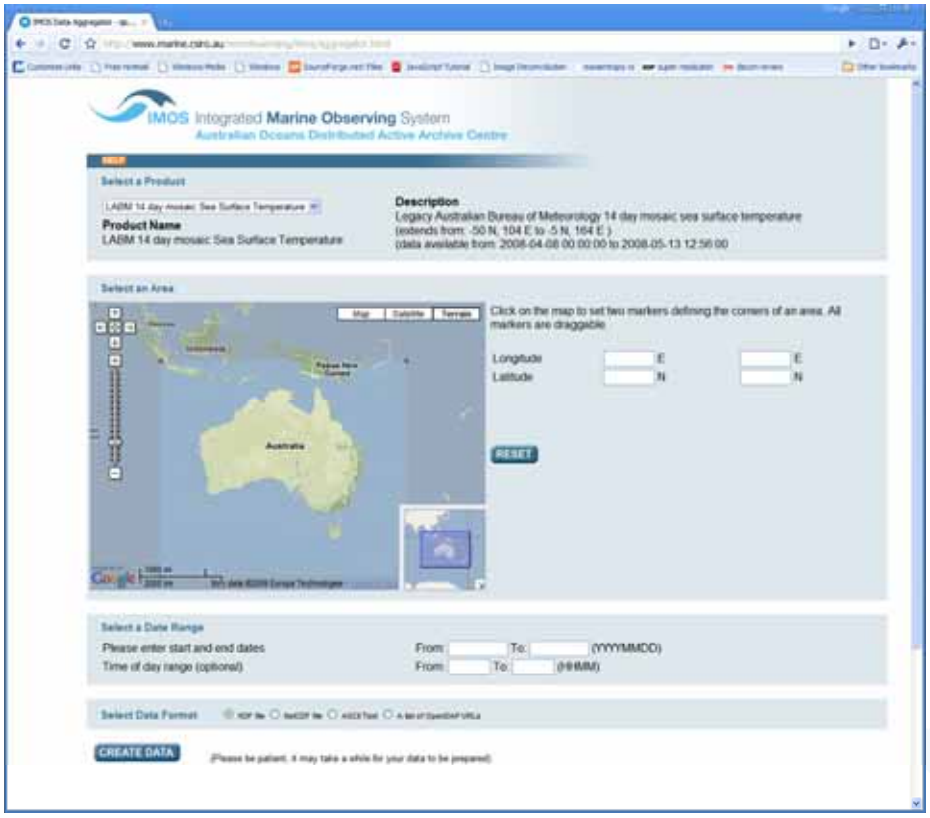


The Aggregation Services Sub-project

This sub-project is developing a spatial data aggregator, capable of operating over an OPeNDAP network, which will allow researchers to combine distributed data without the need to understand the underlying data structures. It employs a geospatially-aware data harvester to create a PostGIS database of the available data, which can then be searched by the user, for any period and within any geographical bounding box, to provide an aggregated file which is then served via the OPeNDAP protocol.



Australian Oceans DAAC GUI (beta)



www.marine.csiro.au/remotesensing/imos/aggregator.html

- incremental development
- AJAX technology

Enhancements

Add more datasets with improved selection menu

Add a description for each dataset

Add a status indicator

Improve error indicators

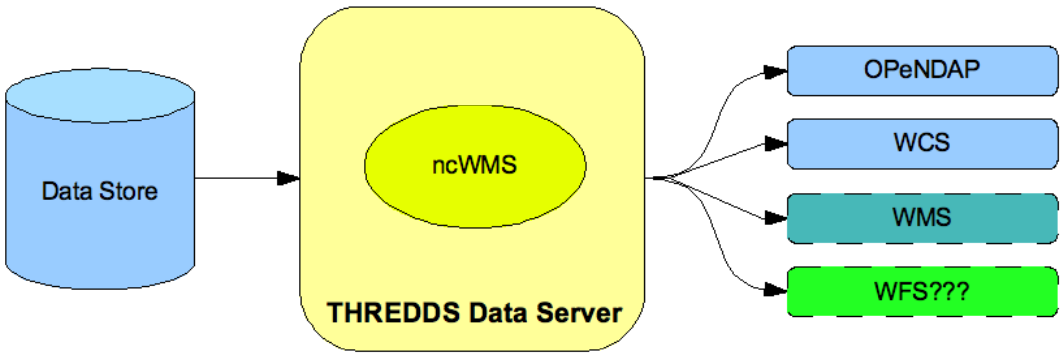
Allow multiple requests

Add simple visualisation

The OPeNDAP-OGC Integration Sub-project

The IMOS marine data management project has specified web services as the standard for delivery of scientific data and the IMOS-GeoNetwork MEST contains and connects with external OGC web services for this purpose. This sub-project has provided OGC Web Map Services (specifically ncWMS) in THREDDS.

THREDDS-WMS



Tightly integrate ncWMS into THREDDS Data Server. This will also include merging some of the data access source code for Java NetCDF library which has significant speed improvements

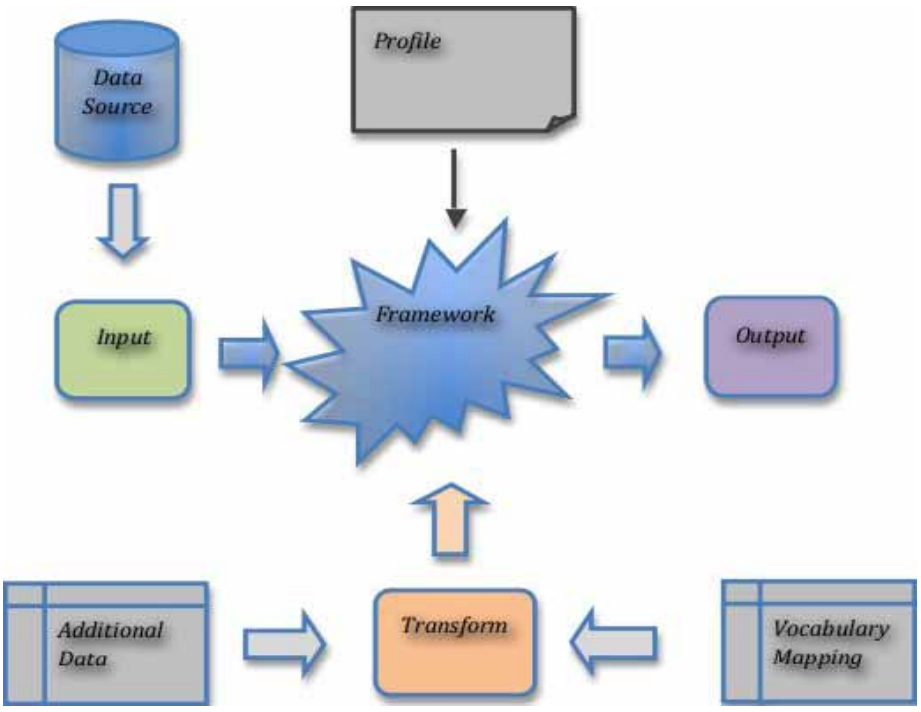
The OPeNDAP Enhancements Sub-project

This sub-project is making modifications to the OPeNDAP servers to enhance their reliability, security and operability with AAF, so they are able to deliver petabyte data stores to the research community. These enhancements will include:

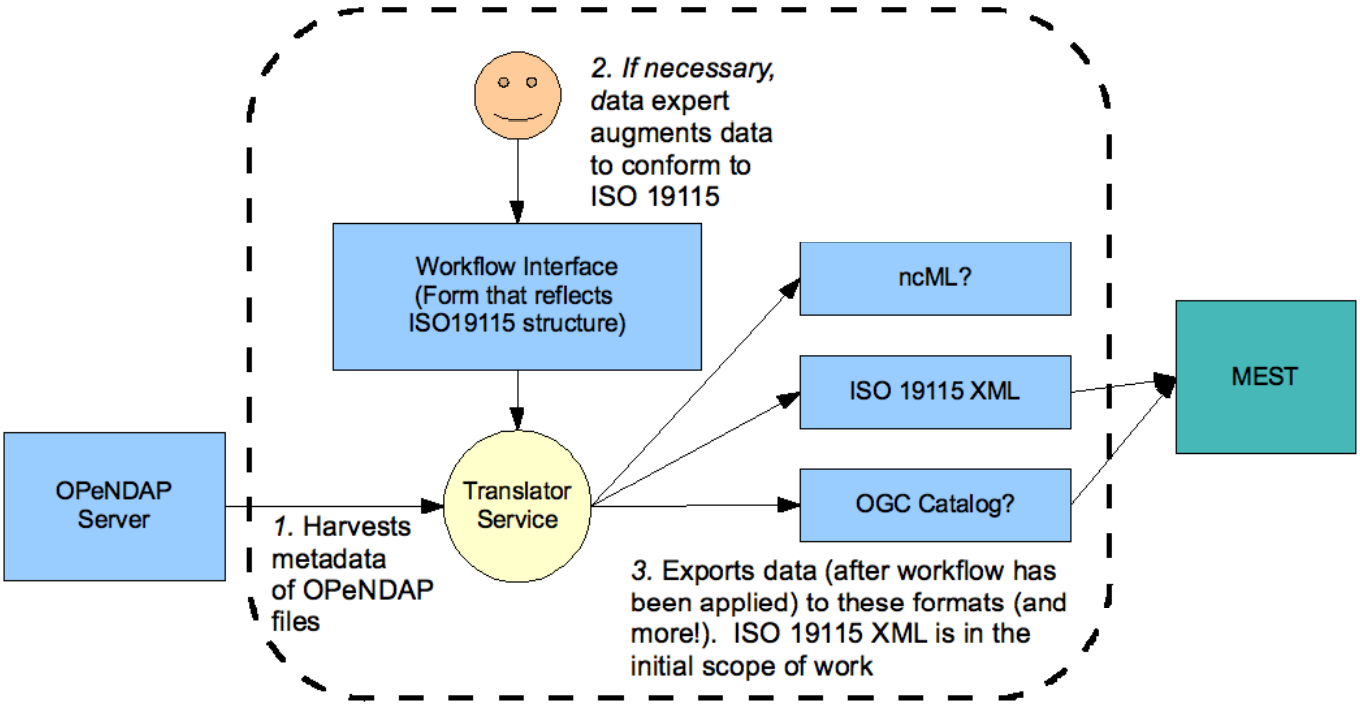
- Non-interactive user authentication of data sets (ie. AAF).
- Trusted service communications between font-end, back-end and gateway servers and between the Digital Library and other OPeNDAP servers.
- Administrative monitoring, control, and configuration interfaces.

The Translation Services Sub-project

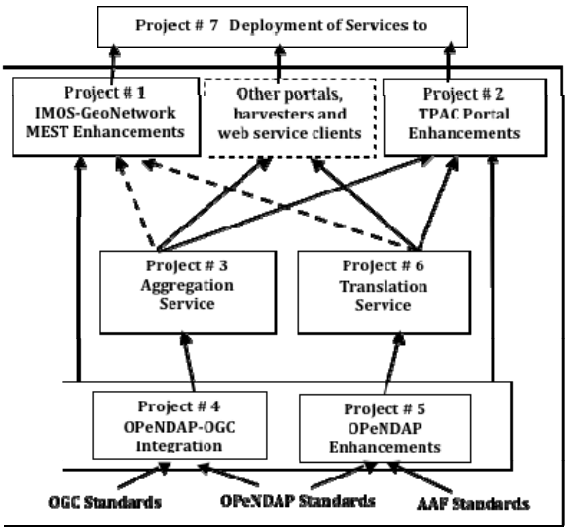
This sub-project is creating a web service that will allow the translation of pre-existing data sets into a common standard widely used in meteorology and oceanography, greatly facilitating dataset discovery and search.



Translation Service



The Relationships Between the Sub-projects



Conclusion

The MACDDAP project aims to utilise international and national data standards, including the OpeNDAP standard protocol for scientific data exchange, the OGC standards for geo-spatial data exchange and the AAF national security standards for single sign-on across federated databases, to support the creation of aggregation and translation web services, which will then be made available to marine and climate researchers via the IMOS GeoNetwork MEST, the TPAC Digital Library Portal and other portals.

The ultimate desired outcome for the MACDDAP project is for marine and climate data throughout Australia to be discoverable, searchable and conformable with standard vocabularies, enabling researchers to collect and aggregate data across disciplines for knowledge discovery.